

## **REMARKS**

The Office Action dated March 17, 2008, has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

### **Status of the Claims**

Claim 33 has been amended to more particularly point out and distinctly claim the subject matter of the invention. Claims 3-5, 8, 10-13 and 28-36 are currently pending in the application and are respectfully submitted for consideration.

### **Improper Finality**

Applicants also respectfully submit that the finality of the outstanding Office Action is improper because the Office Action did not make out a prima facie case of obviousness under 35 U.S.C. § 103(a) at least with respect to claim 4. Per 37 C.F.R. § 1.104(b), an Office Action must be complete as to all matters. While the Office Action stated on page 4 that “[a]s for claims 4 and 10, the gas is inert or nitrogen gas as noted in the last paragraph of page 1 [of DiCarlo et al.]”, claim 4 recites additional features that were not addressed. For instance, claim 4 recites, in part, that “the in-situ grown coating on each fiber surface has a carbon-rich composition”, features which are not discussed in the Office Action.

MPEP § 2143.03 indicates that, “**All words** in a claim must be considered in judging the patentability of that claim against the prior art” (emphasis added). Furthermore, MPEP §

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2143 states that “[t]he key to supporting any rejection under 35 U.S.C. 103 is the **clear articulation** of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR* noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit” (emphasis added). Because the Office Action failed to consider all the features in the rejected claims, and because the rejection lacks a clear articulation of the reasons why these features would allegedly have been obvious, the rejection cannot be supported per the requirements set forth by the MPEP and the United States Supreme Court. Therefore, the Office Action failed to make a *prima facie* case for obviousness by failing to address all the limitations recited in the pending claims, and as such, the finality of the outstanding Office Action is improper.

Accordingly, it is respectfully submitted that the finality of the outstanding Office Action is improper and respectfully requested that the finality be withdrawn.

#### **Rejections under 35 U.S.C. § 112**

Claims 33-36 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. With respect to claims 34-36, the Office Action stated on page 2 that “the specification fails to disclose that *after* the heat treatment a further coating is provided”. Applicant respectfully submits that these features are discussed in the specification.

The present application discusses that in some embodiments, “batch processing using

thermal treatment at one atmosphere pressure for the maximum time-temperature conditions of one hour and 1800°C” is performed (see, for example, paragraph [0050]). The application then discusses that “an 8-ply stack of SYLRAMIC-iBN fabric” was formed and provided to composite vendors (see, for example, paragraph [0054], of the application). “At the composite vendors, two different types of thin (~0.5 μm) BN-based fiber coatings, A and B, were chemically vapor infiltrated onto the fiber surfaces” (see, for example, paragraph [0055], of the application). As such, the present application discusses that the coatings may be deposited on the fibers via chemical vapor infiltration **after** thermal treatment, as claimed.

With respect to claim 33, the Office Action stated on page 2 that “the specification fails to disclose an *additional* external reshaping stresses are applied to the sample.”

However, the present application discusses that some embodiments have these features:

[A] vane-shaped graphite mandrel was placed inside a 50-mm diameter tubular-shaped 2D-braided SYLRAMIC fiber architecture (Fig. 7(a)), which was then subjected to the high temperature nitrogen conditions that convert the fibers to SYLRAMIC-iBN. The net result was not only complete fiber conversion to SYLRAMIC-iBN, but as shown in Fig. 7(b), the tubular architectural perform was permanently formed into a vane shape after mandrel removal. Thus for complex architectural preforms, this invention can be used to simultaneously improve SYLRAMIC SiC fibers and creep-form the performs into component shapes with no residual elastic stresses remaining in the architectures.

(See, for example, paragraph [0053]). Thus, while in a furnace, additional external reshaping stresses are applied to the sample, so that during the treatment step, these reshaping stresses are allowed to be reduced by creep-relaxation within the ceramic fibers, as claimed.

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Further, as MPEP 2163(I)(A) states, “There is a **strong presumption** that an adequate written description of the claimed invention is present when the application is filed”. Per the above, adequate support for the claimed features is present in the present application. Thus, support is not an issue, and possession is certain because the concept is described in the specification as originally filed.

Accordingly, it is respectfully submitted that the rejection is overcome and respectfully requested that the rejection be withdrawn.

Claim 33 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Specifically, the Office Action stated on page 2 that “[t]he term ‘more technically advantageous net perform’ in claim 33 is a relative term which renders the claim indefinite.” Claim 33 has been amended to remove the recitation “more technically advantageous”.

Accordingly, it is respectfully submitted that the rejection is overcome and respectfully requested that the rejection be withdrawn.

### **Rejection under 35 U.S.C. § 103**

Claims 3-5, 8, 10-13 and 28-32 were rejected under 35 U.S.C. § 103(a) as being unpatentable over DiCarlo et al. (NASA Tech Brief entitled “SiC/SiC composites with improved BN coating on fibers” (2007)) in view of Sacks (U.S. Patent No. 6,040,008). The Office Action took the position on pages 3-5 that DiCarlo et al. and Sacks teach all of the features of the rejected claims. Applicants respectfully submit that DiCarlo et al. and Sacks,

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both individually and in combination, fail to teach or suggest the features of the above-rejected claims. Reconsideration of the claims is respectfully requested.

Independent claim 3, from which claims 4, 5, 8, 10-13 and 28-36 depend, recites a method for producing high-strength ceramic fibers and ceramic fiber architectural preforms with an in-situ grown coating on each fiber surface with a composition different than that of a bulk fiber, including preparing an original sample composed of an architectural preform formed from an as-produced high strength ceramic fiber type. The architectural preform is at least one of a finite section of a continuous-length multi-fiber tow, a two-dimensional textile-formed fabric, and a three-dimensional textile-formed complex-shaped perform. The method also includes placing the original sample in a processing furnace and thermally treating the original sample in the processing furnace at a processing temperature and a hold time of five hours or less in a processing gas having a composition, a pressure, and a flow rate. The fiber composition, the processing temperature and the hold time, and the gas composition, the pressure, and the flow rate are preselected to allow atomic decomposition from the surface of each fiber, with reduced loss in an average tensile strength of the fibers within the thermally treated sample.

As will be discussed below, DiCarlo et al. and Sacks, both individually and in combination, fail to teach or suggest the features of the presently pending claims.

DiCarlo et al. generally discusses “SiC/SiC composites with improved BN coating on

fibers” (see title, page 1). “In order to impart strength and fracture toughness to a fiber/matrix composite material, one must formulate it so that under high stress, it fails in a fiberpullout mode rather than a brittle-fracture mode” via “a fiber/matrix interfacial layer of a material (denoted the ‘interphase’) that is weakly bonded to both the fibers and the matrix to insure that matrix cracks are deflected away from the fibers” (see page 1, second paragraph, of DiCarlo et al.).

Claim 3 recites, in part, “preparing an original sample composed of an architectural perform formed from an as-produced high strength ceramic fiber type, wherein the architectural perform is at least one of a finite section of a continuous-length multi-fiber tow, a two-dimensional textile-formed fabric, and a three-dimensional textile-formed complex-shaped perform”. The Office Action stated on page 3 that “DiCarlo teaches of providing a coating of BN on a bulk SiC fiber or onto fibers woven into cloth performs”. As such, Applicants believe that the Examiner may be equating a “woven fiber perform” as discussed in DiCarlo et al. with an “architectural preform”, as claimed. Applicants respectfully submit that DiCarlo et al. fails to teach or suggest these features.

DiCarlo et al. discusses on page 3 that “a tow” of fiber “is formed into a woven fiber perform prior to CVD BN coating” (see page 1, last paragraph, of DiCarlo et al.). However, DiCarlo et al. is silent as to a finite section of a continuous-length multi-fiber tow, a two-dimensional textile-formed fabric and a three-dimensional textile-formed complex-shaped

preform, as claimed. Rather, in DiCarlo et al., it is merely discussed that when a fiber is “formed into a woven fiber perform ... many of the fibers are in contact with each other and therefore do not become completely coated with BN” (see page 1, last paragraph, through page 2, first paragraph). As such, DiCarlo et al. discusses forming a tow into a woven fiber perform, but is silent as to the types of architectural performs that may be created, nor does DiCarlo et al. discuss a finite section of a tow that has a “continuous-length”, as claimed. Further, nothing is cited or found in Sacks that teaches or suggests these features. Additionally, the record has not provided adequate support that complex architectural performs, such as three-dimensional textile-formed complex-shaped performs, as claimed, were possible in October, 2000, when the Dicarlo et al. NASA Tech Brief is dated.

Claim 3 also recites, in part, “placing the original sample in a processing furnace” and “thermally treating the original sample in the processing furnace at a processing temperature and a hold time of five hours or less in a processing gas having a composition, a pressure, and a flow rate”. The Office Action does not appear to address “thermally treating the original sample” where the original sample is an “architectural perform”, as claimed. While DiCarlo et al. discusses “a heat treatment of **fibers** at a temperature of 1,800 C in either an inert or nitrogen gas” (see page 2, last full paragraph, emphasis added), nothing is cited or found that teaches or suggests thermally treating an original sample in an **architectural perform** of the types claimed above. Further, nothing is cited or found in Sacks that teaches

or suggests these features.

Claims 4, 5, 8, 10-13 and 28-32 depend from claim 3 and add further features thereto. Thus, the arguments above with respect to independent claim 3 also apply to the dependent claims.

Accordingly, it is respectfully submitted that the rejection is overcome and respectfully requested that the rejection be withdrawn.

### **Conclusion**

For at least the reasons presented above, it is respectfully submitted that claims 3-5, 8, 10-13 and 28-36, comprising all of the currently pending claims, patentably distinguish over the cited art. Accordingly, it is respectfully requested that the claims be allowed and the application be passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, Applicants' undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.



In the event this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,



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